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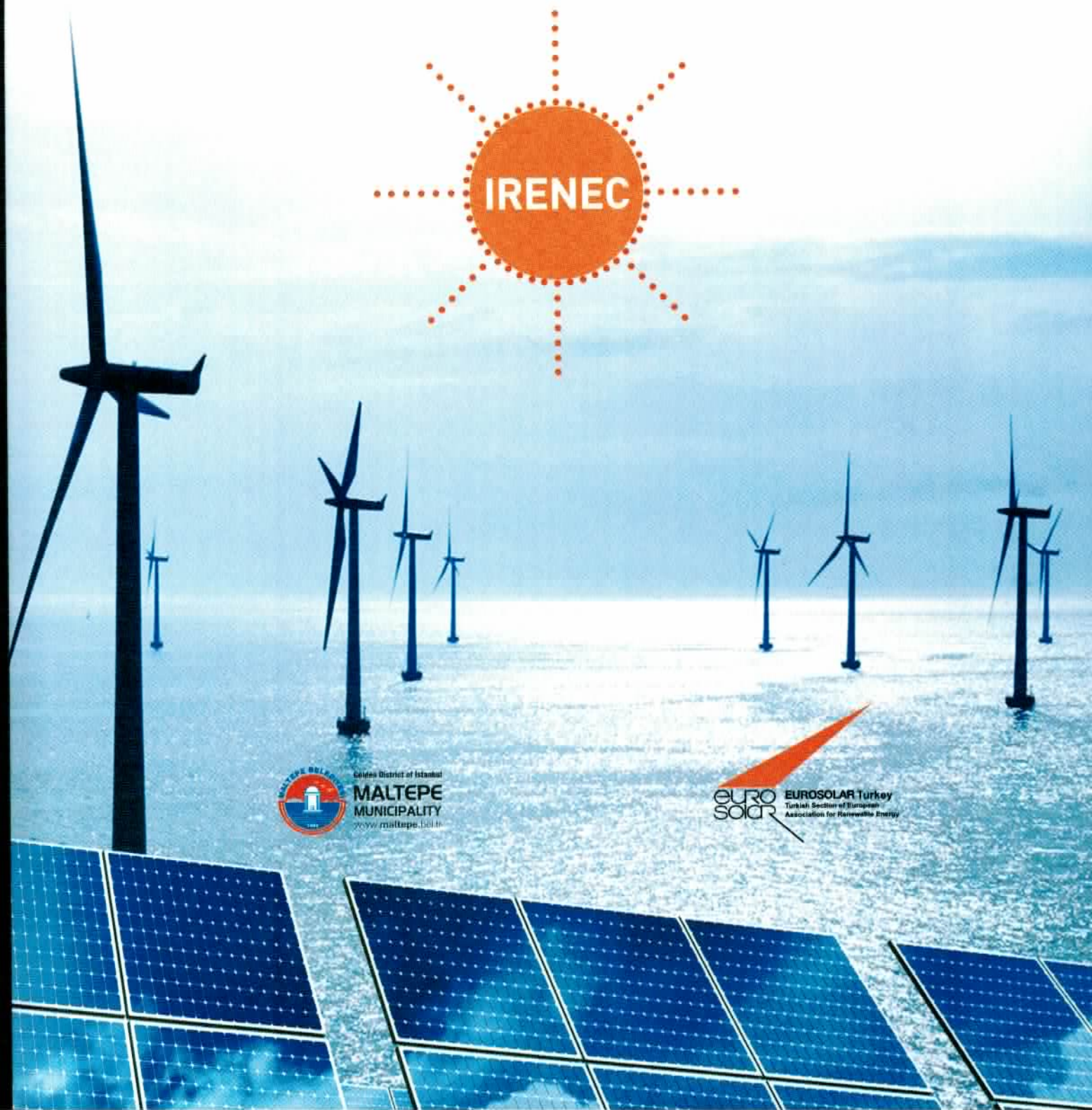

THE IMPACT OF RENEWABLE ENERGY POLICY ON ECONOMIC GROWTH AND EMPLOYMENT IN THE EUROPEAN UNION

Related Conference Topic: 5. Energy Policies, Legal Framework, Decision Support Models

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ABSTRACT

Policies that support renewable energy sources (RES) give a significant boost to the economy and the number of jobs in the EU. Improving current policies so that the target of 20% RES by 2020 can be achieved will provide a net effect of about 410,000 additional jobs and 0.24% additional gross domestic product (GDP). These results stem from the Employ-RES study, which was conducted by a consortium of EU research institutions led by Fraunhofer ISI on behalf of the European Commission's Directorate-General Energy and Transport and finalised in 2009, was the first study to assess the economic effects of supporting RES in this detail, looking not only at jobs in the RES sector itself, but taking into account its impact on all sectors of the economy.

The study is based on a sound analysis of the historic situation, based on an input-output model (MULTIREG) that was used to assess the effect of developments in the RES sector on other economic sectors. With regard to future developments the analysis employs a RES-sector bottom-up model (Green-X) that was designed to simulate the effect of RES support policies to 2030. In order to calculate future economic effects, two well-established, independent macro-economic models (NEMESIS and ASTRA) were used in parallel and their results were compared for maximum reliability – a unique approach. Both the approach and the results have been peer-reviewed.

Keywords: *Renewable energy, Employment, Economic Growth, Prospective Analysis.*

1 INTRODUCTION

This paper summarises the approach, outcomes and findings of a study named Employ-RES, which was conducted by a consortium of EU research institutions led by Fraunhofer ISI on behalf of the European Commission's Directorate-General Energy and Transport and finalised in 2009. This study was the first study to assess the economic effects of supporting RES in this detail, looking not only at jobs in the RES sector itself, but taking into account its impact on all sectors of the economy. For further details on approach, results and conclusions we refer to [1].

1.1 Background

The Commission Communication 'An energy policy for Europe' [2] clearly states the points of departure for a European energy policy as: 'combating climate change, limiting the EU's external vulnerability to imported hydrocarbons, and promoting growth and jobs'.

The promotional effect of increased diffusion of renewables on the first two objectives is largely undisputed. Renewables have clearly shown to be an indispensable contribution to greenhouse gas reductions and increased security of supply in Europe.

There is, however, still uncertainty about the exact contribution of renewables to the third cornerstone: promoting growth and jobs in terms of the objectives of the Lisbon Strategy. As stated in the RES roadmap [3]: 'Studies vary in their estimates of the GDP impact of increasing the use of renewables, some suggesting a small increase (of the order of 0.5%), and others a small decrease'.

While most policy makers believe that increased use of RES and job creation can permanently go hand in hand, others assume that the distribution effects and the budget effects turn a large gross employment effect into a small or even negative net employment effect.

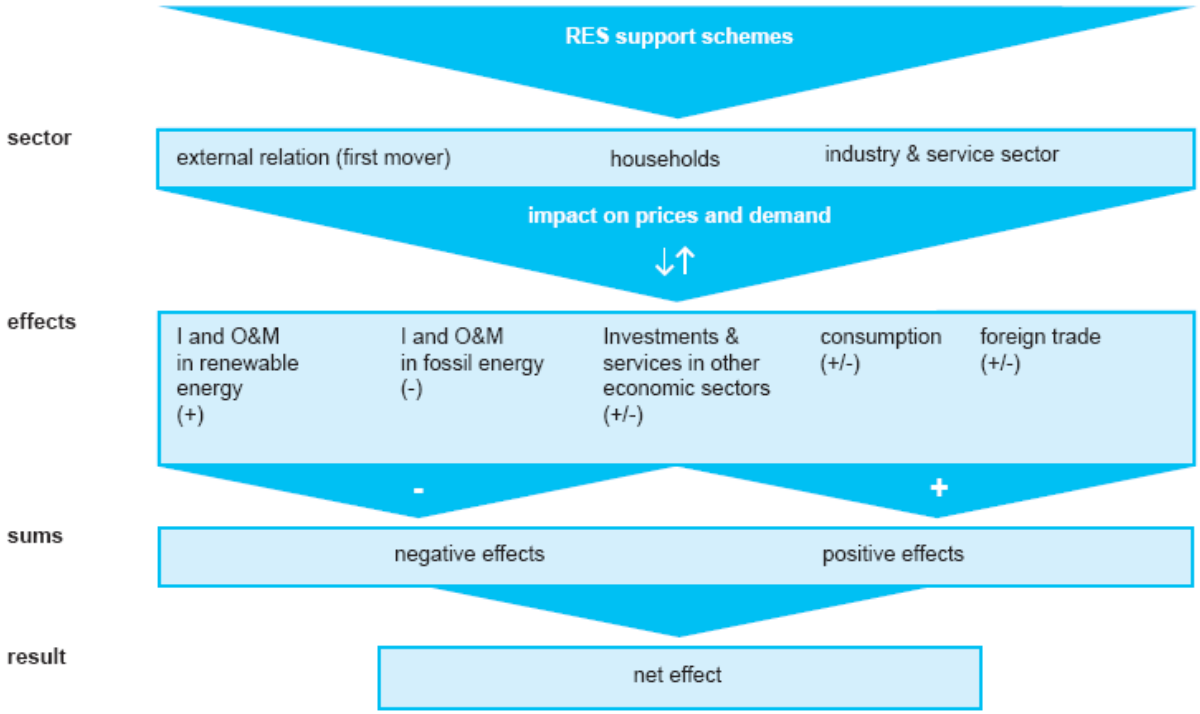
In December 2008 the renewable energy Directive for the year 2020 was agreed on by the European Parliament and the European Council. This Directive sets ambitious targets for each Member State with the aim to reach a share of 20% renewable energy in Europe's final energy consumption by 2020. For the implementation of this target, it is important to gain further understanding and awareness of the economic and employment benefits from renewables. Thus, for this purpose the Employ-RES study was launched.

1.2 Objectives

The specific aims of the Employ-RES study were to present an analysis of the effects on employment and economic growth of RES deployment per RES sector, per economic sector and per country and to enhance understanding of the various gross and net employment and growth impacts of (an accelerated diffusion of) renewables. In order to create full trust in the quality of the analysis transparency was of key relevance, using a modelling system with a sound scientific basis.

2 METHOD OF APROACH

2.1 Economic effects modelled



Note: I = Investment, O&M = Operation and Maintenance

Figure 1 – Main economic effects (a simple illustration).

Policies promoting a stronger growth of RES deployment affect the economy as a whole. The impact of these policies is not restricted to the energy sector. All economic agents and sectors are directly or indirectly affected. This means that households, industry and services as well as external relationships are influenced by promoting RES deployment. The main effects are changes in prices and demand which in turn have an impact on the output and employment of the economy. All of these effects lead to changes in the structure of economic output and production and thus affect employment. These rather complex economic mechanisms are presented in a simplified form in Figure 1. A positive effect (i.e. increase in employment or GDP) is marked with a "**+**" and a negative effect (i.e. decrease in employment or GDP) with a "**-**". An effect on *gross* employment or GDP includes all the positive effects from RES investments while the effect on *net* employment or GDP represents the difference between all positive and negative effects in the whole economy.

2.2 Modelling approach

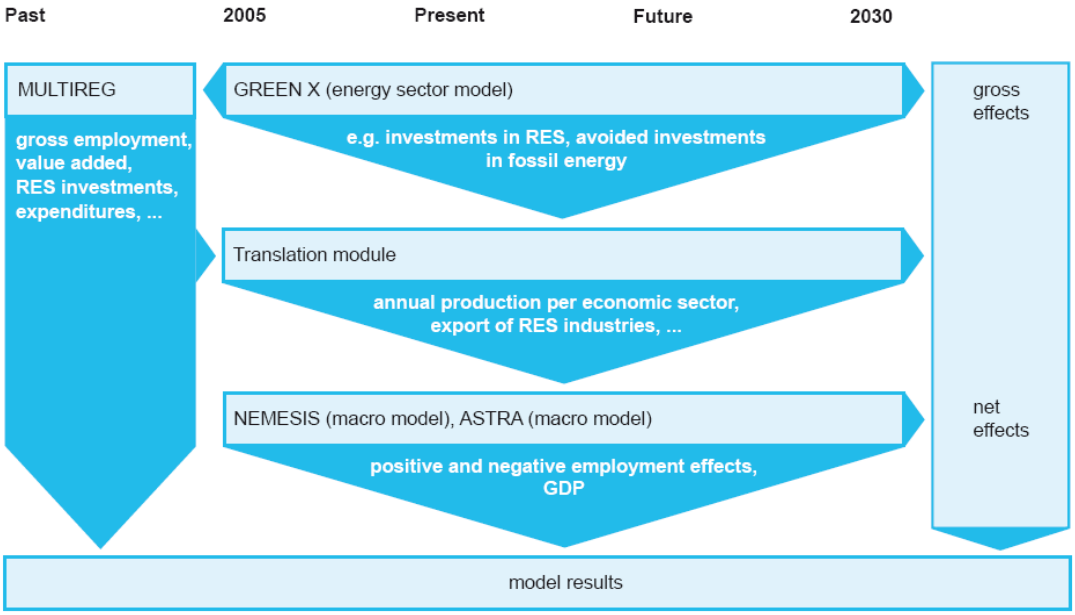


Figure 2 – Modelling approach (linkage of models and databases).

The challenge is to capture all economic mechanisms and effects in a system of models. Furthermore, data and developments on a technological disaggregated level must be connected with economic mechanisms. The unique approach of this study combines technology specific databases and models with macroeconomic modelling tools.

The study is based on a sound analysis of the historic situation, based on an input-output model (MULTIREG) that was used to assess the effect of developments in the RES sector on other economic sectors. With regard to future developments the analysis employs a RES-sector bottom-up model (Green-X) that was designed to simulate the effect of RES support policies to 2030. In order to calculate future economic effects, two well-established, independent macro-economic models (NEMESIS and ASTRA) were used in parallel and their results were compared for maximum reliability – a unique approach. Both the approach and the results have been peer-reviewed.

Figure 2 shows the modelling approach and the link of the different models in a simplified way. The vertical line reflects the data transformation and model output, the horizontal line the time horizon. The figure omits the stakeholder consultation and thorough desk research on RES data, market shares in RES technologies, lead market data and further inputs of statistic historic data.

3 KEY RESULTS

3.1 The starting point – a closer look at 2005

In 2005 the RES sector employs 1.4 million people and generates €58 billion value added. The total gross value added generated by the RES industry reaches €58 billion in 2005, equal to 0.58% of EU Gross Domestic Product (GDP). The RES sector employs roughly 1.4 million people, equal to 0.65% of the total EU workforce. About 55% of value added and employment occurs directly in the RES sector and 45% in other sectors due to the purchase of goods and services.

3.2 Two scenarios for the future: current RES policies and stronger RES policies

The impact on GDP and future employment are shown below for two key scenarios:

- Current RES support policies (Business as usual (BAU-ME) scenario) lead to a share of RES in final energy consumption of 14% by 2020 and 17% by 2030
- Stronger RES support policies (Accelerated deployment policies (ADP-ME) scenario) lead to a share of RES in final energy consumption of 20% by 2020 and 30% by 2030.

This shows that, to meet the EU's 2020 target for RES, stronger support policies than those currently implemented are needed.

3.3 Impacts of achieving 20% RES by 2020 on economic growth and employment

Achieving the 2020 RES target likely leads to total gross value added of the RES sector of about 1.1% of GDP. Assuming business as usual (BAU) polices, the total **gross** value added of the RES sector in the EU-27 in 2020 would amount to € 99 billion (0.8% of total GDP). Based on the accelerated deployment policy (ADP) scenario the value would amount to € 129 billion (1.1% of total GDP). Compared to a situation with no RES policies implemented after 2006 the **additional** gross value added due to RES policies amounts to €22 billion or 0.19% of total GDP for the BAU scenario and € 52 billion or 0.44% of total GDP for the ADP scenario.

Achieving the 2020 RES target likely leads to a net increase in GDP by about 0.24%. The total **net** GDP change due to RES policies in 2020 is expected to amount to 0.11% - 0.14% under the BAU scenario and to 0.23% - 0.25% under the ADP scenario for the EU-27 (ranges according to results of the two models used). Again this is in comparison with a hypothetical scenario in which all RES support policies are abandoned.

Achieving the 2020 RES target likely leads to 2.8 Million jobs in the RES sector in total. Total gross employment in the RES sector in the EU-27 in 2020 will amount to 2.3 million people under the BAU scenario and 2.8 million under the ADP scenario. Compared to the hypothetical scenario in which all RES support policies are abandoned, the additional gross employment due to RES policies amounts to 0.6 million people for the BAU scenario and 1.1 million people for the ADP scenario.

Achieving the 2020 RES target likely generates about 410,000 net additional jobs. The total net increase in employment in the RES sector in the EU-27 in 2020 compared to the hypothetical scenario in which all RES support policies are abandoned will amount to about 115 - 200 thousand people under the BAU scenario and to 396 - 417 thousand people under the ADP scenario (ranges according to results of the two models used).

4 CONCLUSIONS

Stronger policies are needed to reap maximum economic benefits from RE. The strong growth of biomass and wind onshore in the past needs to be sustained as these technologies lead to the bulk of current and near-term future RES production, employment and economic growth.

More innovative technologies such as photovoltaic, offshore wind, solar thermal electricity and second-generation biofuels require more financial support in the short-term, but it is precisely these technologies that are additionally needed to achieve the EU's 2020 RES target, to maintain the EU's competitive position on the world market for RES technologies, and to increase employment and GDP in the mid-term. Innovation policy is therefore essential to strengthen the first-mover advantage of Europe's RES industries. If successful, these technologies can help the EU maintain a higher world market share in RES and the net GDP advantage can be about 10% higher than the figures presented above.

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BIOGRAPHIES

Gustav Resch – Gustav Resch is working as senior researcher at Vienna University of Technology, Energy Economics Group. He holds a degree in electrical engineering (Energy Technology) and a PhD in energy economics at Vienna University of Technology. He is responsible for research, project acquisition and scientific coordination in the area of energy policy and energy economics with a focus on renewable energy technologies - with proven expertise on international level. His fields of activity include techno-economic assessments of (renewable) energy technologies, evaluation and design of energy policy instruments and energy modeling (focusing on policy interactions and technology dynamics). He has contributed to several EU studies and policy assessments in the light of "20% Renewable Energy by 2020".

Mario Ragwitz – Mario Ragwitz is senior scientist in the Competence Center Energy Policy and Energy Systems at the Fraunhofer Institute for Systems and Innovation Research (ISI) - heading the business unit Renewable Energies. He is physicist with professional experience in the fields of modelling complex dynamical systems, data analysis, wind energy conversion and solid state physics. He studied physics at the universities of Düsseldorf, Waterloo (Canada) and Heidelberg, and earned his doctorate degree in physics (Dr. rer. nat.) from the University of Wuppertal. His current scientific work includes the topics of innovation research, policy analysis and financing in the field of renewable energy sources, the derivation of R&D and market introduction strategies for renewable energy technologies and modelling energy systems with renewable sources. Mario Ragwitz has been overall coordinator of a number of national and EU projects on renewable energy sources.